Shedding new light on nitrate levels

High nitrate levels in leafy vegetables have the potential to threaten Australian exports. Graham Gosper speaks to NSW DPI researcher Sophie Parks to find out why.

A survey of leafy vegetables from Australia's leading growing areas has revealed high nitrate levels in some samples and identified a need for a reassessment of on-farm fertiliser inputs.

The survey is part of a research project investigating nitrate and nitrite accumulation in Australian produced leafy vegetables. The three-year project, due for completion early next year, is also examining likely causes of high nitrate levels in leafy vegetables and best practices for managing such levels.

Sophie Parks, a NSW Department of Primary Industries (DPI) research horticulturist based at the Gosford Horticultural Institute on the NSW Central Coast, is the project leader. She said excessive nitrate concentrations in leafy vegetables are recognised as undesirable for human health reasons and because of their affect on the quality of the produce. "Vegetables with a high level of nitrate, for example, are more likely to develop soft rots compared with those with lower nitrate levels," she said.

Despite such evidence there has been little industry focus on nitrate levels in Australia. Sophie said one reason for this is that excessive nitrate levels in vegetables have been commonly associated with poor growing conditions involving low light levels. "Research in Europe has shown that nitrates are high in lettuce and spinach grown in the short days and low light levels of winter," she said. "The high light intensities enjoyed year round by growing areas in Australia have led to a widespread belief that the industry here is free of problems associated with excessive nitrate levels in vegetables."

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However the results of the survey and experiments conducted as part of the leafy vegetables project suggest otherwise. Sophie conducted the survey over 12 months using leafy vegetables sourced from Queensland, Victoria and NSW. "We found high concentrations of nitrate in some samples and very high concentrations in some Asian vegetables such as choy sum, tat soi and buk choy," she said. "No leafy type had exclusively high levels and some lettuce types tended to have lower concentrations, especially head lettuce."

Sophie said a series of experiments revealed that the high nitrate levels found in some samples were most likely to due to the supply of nitrogen fertiliser fed to the plants, and not due to poor light conditions.

The survey also identified some vegetable samples with high nitrite levels, though Sophie said there were probably too few for this to be a concern for the industry. "Nitrite levels were not affected by fertiliser supply or light," she said. "However, nitrite may still be worth monitoring alongside nitrate in the future." Sophie has found no evidence in her study to support the theory that poor storage of vegetables can exacerbate nitrite levels.

Sophie said one clear message from the leafy vegetables study was that effective on-farm fertiliser management programs hold the key to controlling the nitrate concentration in vegetables in Australia.

She said with high nitrate levels almost impossible to detect without expensive testing, growers face a difficult task in getting fertiliser applications just right. With that in mind Sophie is investigating the possible use of an instrument, the ion selective electrode, which directly measures nitrate in solution, as a simple and relatively cheap way of measuring nitrate in fresh vegetables. "The application would allow larger